Lymnæa stagnalis Linn. Canadarago Lake.
Lymnæa columella Say. Allan, Weaver Lakes.
Lymnæa palustris Müller var. Canadarago Lake, Otsego Lake.
Physa ancillaria Say. Allan Lake.
Physa heterostropha Say. Canadarago and Otsego Lakes and many streams.
Planorbis trivolvis Say. Allan Lake.
Planorbis dilatatus Say. Canadaraga Lake.
Planorbis campanulatus Say. Canadarago Lake.
Planorbis bicarinatus Say. Sunset Creek, Canadarago Lake.
Planorbis exacutus Say. Near Weaver Lake.
Planorbis deflectus Say. Young's Lake.
Planorbis albus Müller. Allan Lake, Otsego Lake.
Ancylus rivularis Say. Oak Creek.
Ancylus tardus Say. Weaver Lake.
Ancylus fuscus Adams. Allan Lake.
Ancylus parallelus Hald. Town Creek.
Sphærium simile Say. Sunset Creek, Town Creek, Allan Lake, Weaver Lake.
Sphærium rhomboideum Say. Allan Lake.
Sphærium striatinum Lam. Sunset Creek.
Pisidium ventricosum Prime. Canadarago Lake.
Pisidium noveboracense Prime. Canadarago Lake.
Lampsilis radiatus Gmelin. Canadarago Lake.
Strophitus edentulus Say. Sunset Creek.
Anodonta marginata Say. Weaver Lake.
Alasmidonta undulata Say. Sunset Creek.
Unio complanatus Solander. Oak Creek.

A NOTE UPON THE INSUFFICIENCY OF THE OPERCULUM AS A BASIS OF CLASSIFICATION IN ROUND-MOUTHED SHELLS.

BY L. P. GRATACAP.

In 1801 Lamarck established the genus Cyclostoma which he made for the reception of a very miscellaneous and unclassified group of shells, characterized however by certain common features as the entire round aperture, continuous peristome, and operculum.

Among this unassorted assemblage were placed marine, fluviatile and terrestrial shells. Later Lamarck withdrew the marine and fluviatile shells, and in 1819 he limited the genus Cyclostoma to terrestrial species.

In 1829 the Rev. M. G. Berkeley described the anatomical structure of *Cyclostoma elegans* (Zoölogical Journal, vol. iv, p. 278), and alluded to the operculum as "ovate spiral, calcareous." This description was, up to that time, the most extended and accurate that had been published, of the soft parts of the animal of this group of mollusca.

In the second edition of the *Histoire Naturelle des Animaux sans Vertebres*, edited by Deshayes and Milne-Edwards (1838), the diagnosis is *Testa varia; anfractibus cylindraceis. Apertura circinata, regularis: marginibus orbiculatim connexis, aetate patenti-reflexis. Operculum.*

In his observations Lamarck alludes to the similarly circular and entire margins of the aperture of *Paludina*, but remarks that in adult cyclostomas the edge of the peristome is reflected, whereas in *Paludina* and generally in fluviatile shells these edges are sharp and plain.

The comments of the editors exhibit the diversity of views then held by naturalists as to the affinities of these interesting shells; some gave full weight to the fact of their aerial respiration and grouped them in a special order, in which their manner of respiration, their terrestrial habit, and the possession of an operculum formed distinguishing or separative features; while others considering their respiration unimportant, dwelt upon morphological resemblances to *Turbo*, *Trochus* and *Scalaria*. These resemblances were the two tentacles, the absence of eye-stalks, the eyes placed at the base of the tentacles, and the respiration anteriorly open. This latter view was advocated by Cuvier. It was further emphasized by their unisexual nature, and in the armature of their lingual ribbon, which however rather coincides with that of pectinibranchiate gasteropods. Milne-Edwards and Deshayes regarded the cyclostomas as terrestrial Turbos breathing air.

Amongst the forty-five species enumerated by Lamarck in 1838, are representatives of the genera *Pterocyclas*, *Cyclophorus*, *Choanopoma*, *Tudora*, *Chondropoma*, *Helicina*, *Cyclotus*, *Otopoma*, *Leptopoma*, *Truncatella*, *Megalomastoma*, and *Realia*.

Draparnaud had first separated the marine round-mouthed shells from their supposed terrestrial congeners, which led Lamarck to erect his genus *Delphinula* for the reception of some of the marine forms, and later *Paludina* for others, which genus was substituted for his own *Vivipara*. *Helicina* although proposed as a genus by Lamarck was not grouped by him near the cyclostomous genera. Its operculiferous character was known, but in spite of this fact its position was assigned in the family of the Colimaces (Pulmonifera), amongst the helices, bulimi and pupas. Ferussac had first recognized that the genera *Helicina* and *Cyclostoma* were closely related, and had, in deference to their similar breathing organization, placed them at the end of the air-breathing gasteropods.

Reeve united *Pupina*, *Truncatella*, *Cyclostoma*, and *Helicina* in the single family Cyclostomacea. Menke as early as 1828 appears to have separated the operculate shells into two families, typified by *Helicina* and *Cyclostoma*. Dr. Gray (1842) first pointed out the significant morphological distinction between *Cyclostoma* and *Helicina*, and assigned to the family Helicinidae the three genera *Helicina*, *Lucidella*, and *Alcadia*, while Swainson (1840) had grouped together *Helicina* Lam., *Pachytoma* Swains., *Oligyra* Say, *Trochatella* Swains., and *Lucidella* Swains. In the monograph (1846) in Kuster's Conchylien Cabinet upon "Die gedeckelten Lungenschnecken," by L. Pfeiffer, the family Helicinacea was regarded as composed of the genera *Trochatella* Swains., *Lucidella* Swains., *Helicina* Lam., and the family Cyclostomacea of *Cyclostoma* Lam., *Choanopoma* Pfr., *Cyclophorus* Montf., *Leptoma* Pfr., *Megalomastoma* Guilding, *Pupina* Vignard, *Callia* Gray, *Pomatias* Studer, *Aulopoma* Trosch., *Craspedopoma* Pfr., *Myxostoma* Trosch., *Pterocyclas* Bens., *Acicula* Hartmann, *Geomelania* Pfr., *Hydrocena* Parreyss.

The generic divisions thus slowly evolved had been largely based upon the characters of the opercula, and it seems that the credit of emphasizing this feature was due to J. E. Gray, who in 1825 published in the Zoölogical Journal and Philosophical Transactions the results of his observations on their structure, formation and growth, and insisted on their affording "characters for the division of families and genera as the shell of the gasteropods themselves, and that to neglect them in the description of the genus or species is quite as rational as to describe only the single valve of a bivalve shell." The

closing words of this quotation allude to Gray's opinion that the opereulum of the gasteropods was homologous or identical with the second valve of a lamellibranch.

(*To be continued.*)

HELIX HORTENSIS IN NEWFOUNDLAND.

BY T. D. A. COCKERELL.

Mr. L. P. Gratacap has very kindly permitted me to examine a dozen specimens of *Helix hortensis* which he collected at Little Codroy river, Newfoundland, as reported in NAUTILUS, November, p. 78. They are thin, and the dark bands when present are dull reddish-brown, not black. The forms represented are:

(1) Clear yellow, bandless = *lutea* Moqnin. Two.

(2) Greenish-yellow, bandless = *subglobosa* Binney. One. This seems to have been stained owing to the decay of the animal, and may originally have been more nearly a pure yellow.

(3) Yellow, five-banded = *quinquevittata* Moquin. Five.

(4) Yellow, formula (123)45 = *pauluccia* Locard. One.

(5) Yellow, all the bands united = *bouchardia* Moquin. Three.

In the British museum there is an example of the variation *vallotia* Moquin, from Labrador. It is yellow, with formula, O_{345}.

Mr. Gratacap has also permitted me to see the shells collected at Seydisfiord, Iceland, as reported in NAUTILUS, p. 79. They are *Helix arbustorum*, rather thin, but otherwise typical.

NOTES.

OYSTERS CARRIED BY SEAWEED.—Some time ago an oyster-breeder in Morbihan, France, named Martine, called the attention of the French Academie des Sciences to the appearance of unknown algae that threatened to ruin the oyster-beds established at the mouth of the river Vannes. These algae (which the breeders called ballons—balloons) assume the form of little brownish-green leather bottles or wineskins, which stick to the oysters, and which, microscopic at the start, very soon reach the size of a large hen's-egg. Formed of a very thin, elastic and rather frail coat, these bottles, usually full of